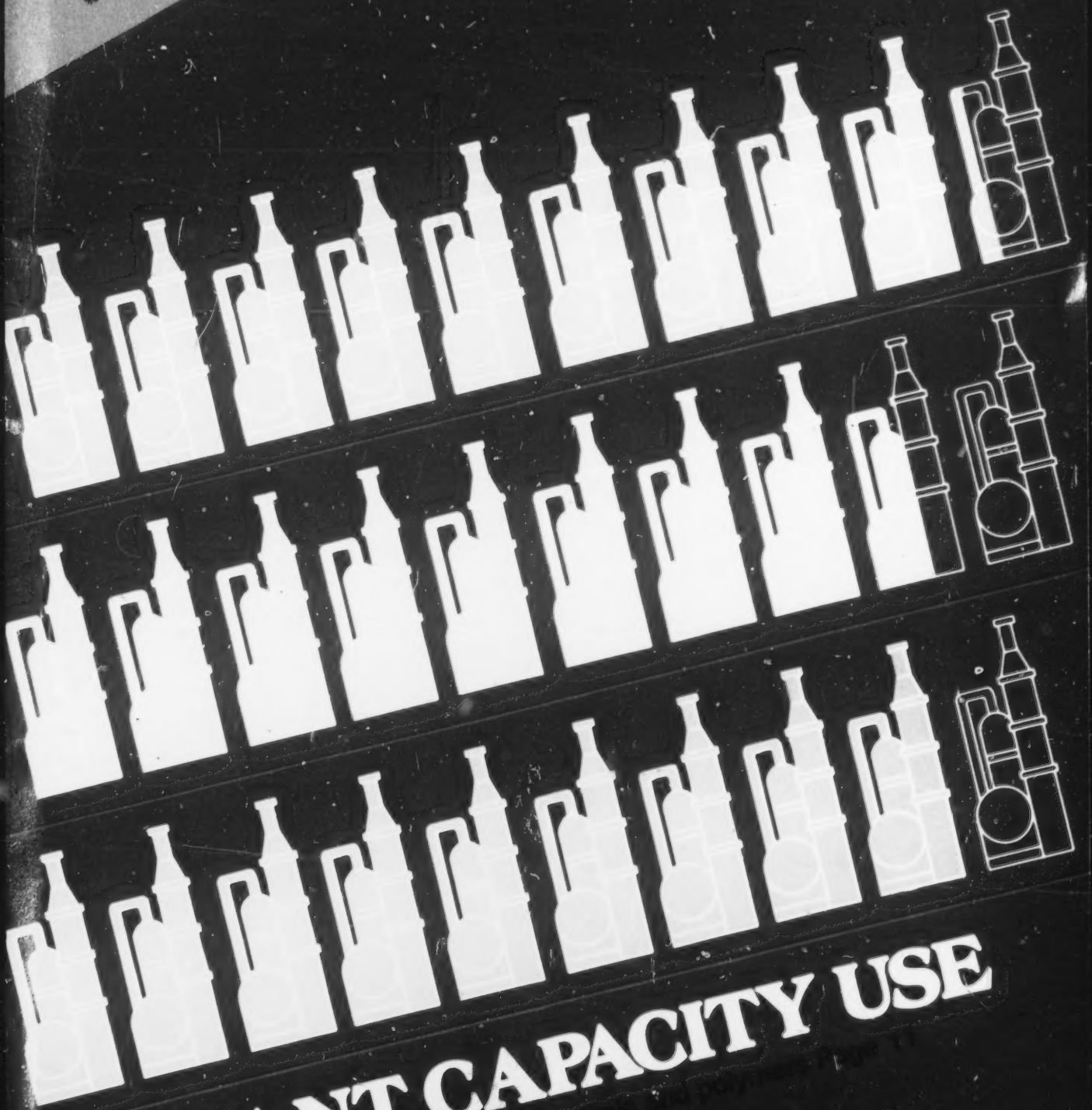
Chemical & Engineering NEWS
October 6, 1975

Du Pont's Irving S. Shapiro wins SCI Medal Page 13



# PLANT CAPACITY USE

October 8, 1979
Volume 57, Number 41
CENEAR 57 (41) 1–52
ISSN 0009-2347

# Chemical & Engineering NEWS

Cover: Chemical society presidents at ACS headquarters, Washington, D.C. (See page 45 for identities.) Photo by Barry Baron/Photo Optik

4 Letters
5 Editor's Page

**Concentrates**
10 Business
15 Government
18 Science/Technology

**The Departments**
36 Awards
37 People
52 Newscripts

## News of the Week

- ***Uniform federal cancer policy*** *contains few surprises, gets mixed reaction—from disappointment to half-hearted support—from industry groups.* ***Page 6***
- ***American Association of Engineering Societies*** *organized to replace Engineers Joint Council; will act as spokesman for the engineering community.* ***Page 6***
- ***Du Pont data*** *on inventory correction process for synthetic fibers, based on cycles of retail buying, indicate fibers may weather the recession fairly well.* ***Page 7***
- ***The Hoechst Group will spend $171 million,*** *15% of total capital outlays, in 1980 on its U.S. operations, says chairman of firm's board of management.* ***Page 7***
- ***Two new biological controls*** *for agricultural products, bacterium to prevent insect damage to stored grain and pheromone for navel orangeworm.* ***Page 8***
- ***Further study*** *of federal coal-leasing policy, regional air pollution loading, and production of synthetic fuels from coal recommended by coal policy project.* ***Page 8***

## Business

- ***Plant capacity use continues high*** *for a number of important chemicals and polymers. Average plant use in the third quarter in plastics and fibers hit 91% of effective top level.* ***Page 11***
- ***Irving S. Shapiro,*** *chairman of Du Pont, has received the Chemical Industry Medal of the Society of Chemical Industry's American Section.* ***Page 13***

## Government

- ***Federal funding of R&D will be up*** *for fiscal 1980; NIH, NSF, and NASA got good budget increases, although about 1% less than Administration requests.* ***Page 16***

## Technology

- ***Continuous process for hydrolysis*** *of cellulose to glucose has been achieved using a twin-screw extruder and a high-temperature sulfuric acid process.* ***Page 19***
- ***Diethylhydroxylamine,*** *a free radical scavenger that is oxidized in the atmosphere, is considered the best choice for chemical control of photochemical smog.* ***Page 20***
- ***Laser light photometer*** *is developed for molecular weight determination with gel permeation chromatography.* ***Page 22***
- ***Boiler monitoring system*** *uses carbon monoxide concentration to measure maximum thermal efficiency; produces fuel savings of 2 to 5% in boilers.* ***Page 22***

## Books

- ***Two books about the origin of life,*** *"Genesis on Planet Earth" and "Lifecloud," are as far apart as Archean Earth and interstellar gas clouds.* ***Page 29***

## ACS News

- ***Nominations for ACS awards,*** *to be presented in 1981, are being solicited now; nominations must be postmarked no later than midnight March 1, 1980.* ***Page 34***

# Chemical plants running near full capacity

**Production of some chemicals stretched capacity limits in the third quarter, but overall capacity use differs little from the first quarter**

The third quarter of 1979 was a good time to measure use of plant capacity in the U.S. basic chemical industry. For a number of important chemicals and polymers, whatever plants put out was the most that they could. Hence, this summer calibrated the effective maximum volume for a number of chemical businesses, barring further investment.

The general level of capacity use in the third quarter still did not come up to 1974, when the chemical economy was in a similarly exuberant state just before the recession hit. But a toned-down version of 1974 is probably what the industry has gone through this year. With a special boost from exports, chemical demand is up over 1978, leading to product price increases and generally improved profits for many chemical companies.

In C&EN's semiannual survey of 28 leading basic chemicals, average nameplate capacity use in the third quarter was 79%. Effective capacity use was 89%.

These figures are well up from capacity use a year ago, which was 75% of nameplate and 82% of effective maximums. However, the most recent percentages are roughly the same as the corresponding 80% and 90% in the first quarter of 1979.

For the industry's basic polymers, the large-volume thermoplastics and synthetic fibers—included in the survey for the first time—capacity use is running even higher. In the third quarter, average plant use in plastics and fibers hit 84% of nameplate and 91% of effective top levels. A year ago, the averages were 80% and 86%.

Within the broad averages this year, performance varied considerably for individual products. Under intense demand pressure, some products ran up to or beyond annual effective maximum output rates. Listing these products makes a good rundown of the hottest chemical and polymer markets—butadiene, soda ash, phosphoric acid, vinyl chloride, low-density polyethylene, high-density polyethylene, and polyvinyl chloride.

Plants can always exceed annual effective maximum output rates as long as maintenance is delayed and a few other corners are cut. But eventually, these lofty marks will have to come down. If the apparent recession now under way in the U.S. deepens in the next six months, a breather may take hold.

Besides the products in obviously tight supply, a number of others are in the same practical market state, although their capacity use is lower. The reason is feedstock scarcity or substitution.

For example, propylene, especially polymer grade, has been in much

## Some capacity use in polymers stretches limits

| Billions of lb | Third-quarter 1979 Capacity nameplate | Third-quarter 1979 Capacity use Nameplate | Third-quarter 1979 Capacity use Effective | Third-quarter 1978 Capacity nameplate | Third-quarter 1978 Capacity use Nameplate | Third-quarter 1978 Capacity use Effective |
|---|---|---|---|---|---|---|
| **Plastics** | | | | | | |
| **Polyethylene**, low-density | 8.5 | 92% | 99% | 8.1 | 90% | 97% |
| **Polyvinyl chloride** | 7.1 | 87 | 101 | 6.8 | 84 | 98 |
| **Polyethylene**, high-density | 5.5 | 95 | 100 | 5.0 | 34 | 88 |
| **Polystyrene** | 5.3 | 74 | 86 | 5.2 | 69 | 77 |
| **Polypropylene** | 5.0 | 80 | 89 | 4.2 | 69 | 77 |
| **Synthetic fibers** | | | | | | |
| **Filament yarn** | | | | | | |
| Polyester | 2.1 | 78 | 83 | 2.1 | 74 | 79 |
| Nylon | 2.0 | 85 | 90 | 1.9 | 87 | 93 |
| Olefin | 0.94 | 66 | 70 | 0.93 | 87 | 71 |
| **Staple** | | | | | | |
| Polyester | 2.6 | 92 | 98 | 2.6 | 82 | 87 |
| Nylon | 1.0 | 91 | 97 | 0.95 | 98 | 104 |
| Acrylic | 0.85 | 84 | 89 | 0.87 | 72 | 77 |
| **AVERAGE** | | **84%** | **91%** | | **80%** | **86%** |

**Sources:** Industry sources, Textile Economics Bureau, C&EN estimates

## C&EN's capacity use indicator—the ground rules

Capacity use at chemical plants is difficult to measure and requires certain assumptions to bring some order to the maze of variables affecting this critical indicator of the industry's health.

With the help of industry and government sources, C&EN measures capacity use as a percentage of both nameplate and effective maximums. Nameplate capacity is the official design capacity of plants at nonstop use all year. Effective capacity is the practical maximum capacity after reductions for regular maintenance shutdowns and changes in product mix. Effective capacity runs from 85 to 95% of nameplate for most chemicals.

Capacity use is given semiannually over a calendar quarter with no seasonal adjustment. The figures include plants actually running. Figures exclude new plants just starting up and old plants knocked out for long periods by accidents or mothballing. As much as possible, capacity figures stay current with expansions and debottlenecking.

Capacity figures do not take into account temporary fluctuations for fuel and electric power interruptions, equipment failure, and feedstock scarcity or substitution. The feedstock variables have been especially important in 1979, further reducing maximum output for a number of important products.

Products in C&EN's capacity use survey are the same as those in the Key Chemicals and Key Polymers series. These are the core products of the industry, the basis for downstream production of thousands of more specialized products. □

## Some effective capacity use hits 100%

| Billions of lb per year unless otherwise noted[a] | Third-quarter 1979 Capacity name-plate | Capacity use Name-plate | Capacity use Effec-tive | Third-quarter 1978 Capacity name-plate | Capacity use Name-plate | Capacity use Effec-tive |
|---|---|---|---|---|---|---|
| **Oil-based petrochemicals** | | | | | | |
| Ethylene | 36.5 | 89% | 99% | 32.5 | 80% | 89% |
| Propylene (chemical) | 20.5 | 72 | 80 | 19.0 | 68 | 76 |
| Butadiene[b] | 4.0 | 90 | 100 | 4.3 | 82 | 91 |
| Benzene (bg) | 2.3 | 77 | 84 | 2.2 | 67 | 74 |
| *p*-Xylene | 5.7 | 79 | 88 | 4.3 | 71 | 79 |
| **Natural gas-based petrochemicals** | | | | | | |
| Methanol (bg) | 1.4 | 85 | 94 | 1.4 | 71 | 79 |
| Formaldehyde (37% solution) | 9.1 | 74 | 78 | 8.7 | 74 | 78 |
| Ammonia (mt) | 20.4 | 91 | 96 | 19.0 | 88 | 93 |
| Urea (mt) | 7.5 | 87 | 97 | 6.2 | 82 | 91 |
| **Chlor-alkalies** | | | | | | |
| Chlorine (mt) | 14.4 | 88 | 93 | 13.9 | 81 | 85 |
| Caustic soda (mt) | 15.1 | 85 | 90 | 14.6 | 77 | 81 |
| Soda ash (mt) | 8.8 | 95 | 100 | 9.8 | 83 | 87 |
| **Acids** | | | | | | |
| Sulfuric (mt) | 56.0 | 81 | 85 | 55.5 | 67 | 71 |
| Phosphoric ($P_2O_5$, mt) | 9.8 | 94 | 99 | 9.8 | 88 | 93 |
| **Industrial gases** | | | | | | |
| Oxygen, Nitrogen (total, liquid, ttd) | 31.2 | 67 | 83 | 31.5 | 57 | 84 |
| Carbon dioxide (ttd) | 12.5 | 52 | 62 | 15.7 | 51 | 60 |
| **Mineral-based inorganics** | | | | | | |
| Sulfur (Frasch, mlt) | 6.7 | 96 | — | 7.6 | 77 | — |
| Phosphorus (mt) | 0.55 | 78 | 85 | 0.57 | 82 | 86 |
| **Plastics monomers** | | | | | | |
| Styrene | 8.4 | 89 | 94 | 8.7 | 80 | 84 |
| Vinyl chloride | 8.4 | 99 | 109 | 8.8 | 71 | 79 |
| Propylene oxide | 3.0 | 83 | 92 | 3.0 | 67 | 74 |
| **Fiber monomers** | | | | | | |
| DMT/PTA[c] | 7.3 | 68 | 80 | 6.6 | 72 | 85 |
| Ethylene oxide | 6.5 | 78 | 82 | 5.9 | 80 | 84 |
| Cyclohexane | 3.2 | 78 | 83 | 3.2 | 63 | 66 |
| **Adhesives and coatings monomers** | | | | | | |
| Phenol | 3.5 | 80 | 89 | 3.5 | 75 | 81 |
| Vinyl acetate | 2.4 | 83 | 87 | 2.1 | 81 | 85 |
| **Pigments** | | | | | | |
| Carbon black | 4.3 | 73 | 85 | 4.0 | 83 | 91 |
| Titanium dioxide (mt) | 0.88 | 88 | 98 | 0.94 | 80 | 89 |
| AVERAGE | | 79% | 89% | | 75% | 82% |

a bg = billions of gal, mt = millions of tons, ttd = thousands of tons per day, mlt = millions of long tons, mg = millions of gal. b Based on extraction capacity of steam-cracking plants and dehydrogenation capacity only of dehydrogenation producers; could be more if extraction capacity of dehydrogenation plants were included. c Dimethyl terephthalate plus purified terephthalic acid, not including acid converted to DMT. **Sources:** Industry sources, C&EN estimates

tighter supply than indicated by its nameplate capacity use of 72%. This important building block chemical has been hit both by scarcity at oil refinery sources and by feedstock substitution at olefins plants.

A feedstock pinch also has been important in holding down capacity use in benzene, even more in demand than propylene for alternate gasoline use as an octane booster. To a lesser degree, urea has been squeezed by a shortage of raw material carbon dioxide due to shutdown of a number of ammonia plants, which coproduce the material. Still, urea is considered a tight product and an export item in great demand.

Because industry executives are divided on whether and how much the chemical industry could feel a recession, a downturn for capacity use caused by market instead of feedstock factors is not yet certain. However, the lack of further gains overall since the first quarter suggests that the big rise in capacity use a year ago has stalled.

*Bruce Greek, C&EN Houston, and William Fallwell, C&EN New York*

# CHECKOFF

## MERGERS

■ **Cook Paint & Varnish**—Completes tender offer for all outstanding shares of its stock at $36.25 per share, thus clearing way for merger into BASF of West Germany

■ **Ciba-Geigy** — Purchases Louisiana Seed Co. of Alexandria, La., for undisclosed amount. Acquisition of seed firm will expand Ciba-Geigy's Funk Seeds operations from 21 to 28 states.

■ **W. R. Grace**—Acquires J. B. Robinson Jewelers, Cleveland-based chain of 47 jewelry stores throughout Midwest. Merger was completed for undisclosed amount of stock.

■ **B. F. Goodrich**—Completes tender offer for Tremco Inc. common stock at $40 per share. At expiration of tender offer, more than 82% of Tremco shares had been received or guaranteed. Under merger terms, Tremco will become wholly owned subsidiary of Goodrich.

■ **National Distillers & Chemical**—Sells Monterey, Calif., FM radio station owned by subsidiary A-B Chemical to Buckley Broadcasting Corp. of Monterey, for $700,000.

■ **Tyco Laboratories**—Acquires Armin Corp., New Jersey-based manufacturer of plastic film and film products. Armin stockholders will receive $16 per share in cash, making value of deal about $27 million.

## NEW PLANTS

■ **Hydrogen peroxide**—FMC plans to complete expansion for high-purity hydrogen peroxide this fall at Vancouver, Wash. Capacity will be doubled to unspecified level.

■ **Styrene-butadiene elastomers**—Arco Polymers subsidiary of Atlantic Richfield plans to enter field of styrene-butadiene-based thermoplastic elastomers with construction of semicommercial facility of unspecified size next to existing operations in Monaca, Pa. Unit is scheduled to come on stream in early 1980.